UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,543	03/11/2004	Ke Han	13361-072001 / MP0413	7807

26200   7590   04/15/2010

FISH & RICHARDSON P.C.
P.O BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER
FOTAKIS, ARISTOCRATIS

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
04/15/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/01/2009*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1, 4 – 7, 10 – 14, 16 – 17, 20 – 21, 23 – 24 and 26* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 4 – 7, 10 – 14, 16 – 17, 20 – 21, 23 – 24 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 01, 2009 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 4 – 7, 10 – 14, 16 – 17, 20 – 21, 23 – 24 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 7 and 17 recite of the limitation "wherein the target polynomial is scaled by a gain factor and said determining ignores the gain factor" at the last lines of each of the claims. It is not clear why the scaling gain factor is needed. Scaling the target

polynomial by a gain factor that is never used and ignored is indefinite. Similarly for

claims 13, 21 and 24.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 13 – 14 are rejected under 35 U.S.C. 102(b) as being anticipated by

Cideciyan et al (US 6,377,635).

Re claim 13, Cideciyan teaches of an apparatus comprising: a branch metric

generator that generates branch metrics comprising a cross-correlation (equations 3

and 4) for a partial response channel (branch metrics, Figs 2 - 14); an add-compare-

select component (Figs.20 - 21) that compares paths (#2002, Fig.20) and determines

survivor paths (SEL, Figs.20 – 21) using generated branch metrics; a memory that

retains metrics information (LATCH, Fig.20); and a trace-back component that

determines a best path of the survivor paths and outputs sequence information based

on the determined best path (*a traceback component is inherent in viterbi detection*).

wherein the partial response channel having a transfer function defined according to a

target polynomial, $T(D)=p_0 +p_1D+...+P_M D^M$ (F(D), Col 4, Lines 11 - 12) the Viterbi

detection operates according to a trellis having 2^M states (2^L states, Col 3, lines 28 -

33), and all survivor paths associated with all the 2^M states in the trellis merge in M

steps (Figs.8 - 14) and wherein the target polynomial is scaled by a gain factor and said

branch metric generator ignores the gain factor (The Examiner does not give functional

weight to the claimed gain factor since the gain factor is not utilized in the system or not

considered on the branch metric generation, *Please see more below on the Response*

to Remarks).

Re claim 14, Cideciyan teaches of wherein the add-compare-select component

compares paths and determines survivor paths by maximizing a quantity (*minimizing*

the metric by minimizing a negative data dependent term (the first sum of equation 3))

defined according to an   equation, $\sum_{k=0}^{N} y_k \cdot y_k^{*}$, where N corresponds to a sequence

length, y_k corresponds to a real channel output, and y_k^{*} corresponds to an estimated

channel output (equations 3 and 4, Col 4, Lines 20 – 44).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of

the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g)

prior art under 35 U.S.C. 103(a).

Claims 1, 4 – 7, 10 - 12, 17, 20 – 21, 23 – 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cideciyan et al (US 6,377,635) in view of Fisher et al (US 6,249,398).

Re claims 1, 7 and 17, Cideciyan teaches of a method and a machine-readable medium (Col 1, Lines 20 – 34, Fig.10) embodying information indicative of instructions for causing one or more machines to perform operations comprising: obtaining an output signal sequence (y_n, equation 1) from a partial response channel (PR); determining an input sequence ($\{\hat{a}_n\}$, Col 4, Lines 10 - 20) of the partial response channel by maximizing (*minimize the metric*, Lines 21 - 50) a cross-correlation of an estimated output sequence with the obtained output sequence (the first sum of equation 4) (*The first sum of equation 4 (cross-correlation) is the only data-dependent term or time-varying term of the equation and to minimize the negative first term is by maximizing the crosscorrelation*), and providing an output corresponding to the determined input sequence (Col 10, Lines 58 – 67, Fig.2); wherein said determining the input sequence comprises employing Viterbi detection (Abstract) using a cross-correlation branch metric (Col 3, Lines 23 – 43); and wherein the partial response channel having a transfer function defined according to a target polynomial, $T(D)=p_0 +p_1D+...+P_MD^M$ (*F(D)*, Col 4, Lines 11 - 12) the Viterbi detection operates according to a trellis having 2^M states (2^L states, Col 3, lines 28 - 33), and all survivor paths associated with all the 2^M states in the trellis merge in *M* steps (Figs.8 - 14); and wherein the target polynomial is scaled by a gain factor and said determining ignores

the gain factor (The Examiner does not give functional weight to the claimed gain factor since the gain factor is not utilized in the system or not considered on Cideciyan crosscorrelation term, *Please see more below on the Response to Remarks*). However, Cideciyan does not specifically of the Viterbi detection providing a robust tolerance of phase uncertainty with the waveform of widely varying amplitude including providing accurate detection decisions even when the amplitude of the waveform is very small.

Fisher teaches of a new class of fixed partial response targets for use in a PRML magnetic medium read channel (Abstract, Lines 1 – 2). To properly equalize and detect the user-data bits, several parameters must be adaptively controlled. The sample values at node (#54, Fig.2) are applied to an error generator circuit (#64, Fig.2) where they are compared to the ideal target response values. These values are in accordance with a $7 + 4D - 4D^2 - 5D^3 - 2D^4$ polynomial. These values are relative and they may be scaled to the A/D output bits as appropriate. The error generator (#64) provides an error signal via (#66) to gain control circuitry (#68), which in turn controls the variable gain filter (#42, #68 controls the amplitude variations). The error generator 64 also provides input via path (#67) to timing control circuitry (#70), which in turn adjusts the sampling phase of the sampler (#46, providing a robust tolerance of phase uncertainty) (Fig.2, Col 6, Lines 20 – 43) in order to have accurate detection decisions (Viterbi Detector, #60) even when the amplitude of the waveform is very small (it is inherent that *gain control would control the gain of a signal of a predetermined amplitude range (smallest amplitude to largest amplitude)*).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have provided a time control circuitry in order to control any phase changes and a gain control circuitry to control undesired amplitude variations of the signal for improving signal acquisition performance in a disk drive read channel.

Re claims 4, 10 and 20, Cideciyan teaches of providing the output corresponding to the determined input sequence comprises providing the determined input sequence to an additional sequence-processing component (ACS, Figs.20 and 21).

Re claims 5 and 11, Cideciyan teaches of the output signal sequence (y_n) comprising a convolution of the input sequence and a target polynomial of the partial response channel (equation 1, Col 4, Lines 4 - 15).

Re claims 6 and 12, Cideciyan teaches of the partial response channel comprising a data storage medium (Col 1, Lines 8 – 15), and said obtaining the output signal sequence comprises sampling a signal generated from the data storage medium (1/T sample rate, Col 4, lines 1 – 3).

Re claims 21 and 24, Cideciyan teaches of a data storage system (Col 1, Lines 8 – 15) comprising: an input line that provides a sampled channel sequence (y_n, equation 1); Veterbi detection means for determining a recovered sequence ($\{\hat{a}_n\}$, Col 4, Lines 10 - 20) from the sampled channel sequence (y_n, Col 4, Lines 4 - 20), the Viterbi

detection means including means for maximizing cross-correlation of the recovered sequence and the sampled channel sequence (first sum, equations 3 and 4, *minimizing the metric by minimizing a negative data dependent term (the first sum of equation 3)*) wherein the sampled channel sequence corresponds to a partial response channel having a target partial response (*F(D), Col 4, Lines 11 - 12*) that is scaled by a gain factor, and the Viterbi detection means ignores the gain factor (The Examiner does not give functional weight to the claimed gain factor since the gain factor is not utilized in the system or not considered on Cideciyan Viterbi detection, *Please see more below on the Response to Remarks*). However, Cideciyan does not specifically of the Viterbi detection providing a robust tolerance of phase uncertainty with the waveform of widely varying amplitude including providing accurate detection decisions even when the amplitude of the waveform is very small.

Fisher teaches of a new class of fixed partial response targets for use in a PRML magnetic medium read channel (Abstract, Lines 1 – 2). To properly equalize and detect the user-data bits, several parameters must be adaptively controlled. The sample values at node (#54, Fig.2) are applied to an error generator circuit (#64, Fig.2) where they are compared to the ideal target response values. These values are in accordance with a $7 + 4D - 4D^2 - 5D^3 - 2D^4$ polynomial. These values are relative and they may be scaled to the A/D output bits as appropriate. The error generator (#64) provides an error signal via (#66) to gain control circuitry (#68), which in turn controls the variable gain filter (#42, #68 controls the amplitude variations). The error generator 64 also provides input via path (#67) to timing control circuitry (#70), which in turn adjusts the sampling

phase of the sampler (#46, providing a robust tolerance of phase uncertainty) (Fig.2, Col 6, Lines 20 – 43) in order to have accurate detection decisions (Viterbi Detector, #60) even when the amplitude of the waveform is very small (it is inherent that *gain control would control the gain of a signal of a predetermined amplitude range (smallest amplitude to largest amplitude)*).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have provided a time control circuitry in order to control any phase changes and a gain control circuitry to control undesired amplitude variations of the signal for improving signal acquisition performance in a disk drive read channel.

Re claims 23 and 26, Cideciyan teaches of a head-disk assembly comprising the input line (direct access storage device, Col 1, Lines 8 – 15, *a head-disk assembly is included in a direct access storage device*).

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cideciyan in view of McEwen et al (US 6,366,418).

Cideciyan teaches all the limitations of claim 13 except of the memory comprising a path memory of length M.

McEwen teaches of partial response channel having a transfer function defined according to a target polynomial, $T(D)=p_0 +p_1D+...+P_M D^M$ (Col 1, Lines 35 - 62) the Viterbi detection operates according to a trellis having 2^M states (2^s states, Col 5, Lines 10 - 65) wherein the path memory length is M (S, Col5, Lines 10 – 35).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a path memory length reduced in size to enable a greater number of sectors to be recorded on the magnetic disk surface (Col 3, lines 20 - 25).

Response to Arguments

Applicant's arguments filed December 01, 2009 have been fully considered but they are not persuasive.

Applicant submits that the prior art used does not disclose the amended claim limitation of "wherein the target polynomial is scaled by a gain factor and said determining ignores the gain factor".

Examiner submits that during the interview that was conducted on November of 2009 the amended claim subject matter on a technical view may not have been included on the prior art. However, after careful reconsideration the amended claim subject matter is indefinite. One skilled in the art would have not understood the use of the scaling factor. It is unclear to scale the target polynomial by a scaling factor that does not affect the determining step or more specifically the cross-correlation part.

Furthermore, above in the rejection of the claims, the Examiner has considered that the claimed limitation has no functional use. The system or method does not utilize the gain factor and ignores it. Therefore the use of the gain factor does not affect the claimed subject matter. Also, one skilled in the art would know that the scaling of a target polynomial by a constant number would not affect the final result. That would be

pure mathematical manipulation. Multiplying or dividing polynomials or equations by a constant number are very well known in the art for bringing the polynomials or equations to a simpler form (for example normalisation).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aristocratis Fotakis whose telephone number is (571) 270-1206. The examiner can normally be reached on Monday - Friday 07:00 - 16:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aristocratis Fotakis/

Examiner, Art Unit 2611

/CHIEH M FAN/

Supervisory Patent Examiner, Art Unit 2611